

***GeoPowering the West: Addressing Barriers to New Geothermal Development***

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***Key Words***

*Geothermal, GeoPowering the West*

**INTRODUCTION**

In January 2000, Senator Harry Reid of Nevada helped the Department of Energy (DOE) announce and kick-off a new DOE technology outreach effort, known as GeoPowering the West. GeoPowering the West, is a public-private partnership that helps to bring geothermal heat and power to millions of homes and businesses across the West. The goals of the Geothermal Technologies Program are:

- To supply the electrical power or heat energy needs of 7 million homes and businesses in the United States by 2015;
- To double the number of States with geothermal electric power facilities to eight by 2006; and
- To reduce the levelized cost of generating geothermal power to 3-5 cents/kWh by 2010.

GeoPowering the West (GPW) is the communication and outreach component of the DOE Geothermal Technologies Program designed and implemented to complement the research and development activities conducted by the Department and its national laboratories. It encompasses efforts on a state and local basis across the western United States to significantly increase the use of geothermal energy over the next decade. *GeoPowering the West* partners with organizations from both the private and public sectors that include other federal agencies, state and local agencies, federal, state, local and Tribal officials, academia, geothermal developers, consumers, and the environmental community.

GeoPowering the West addresses non-technical and institutional barriers to geothermal development. The focus is on highlighting the potential economic, environmental, and energy security benefits from development of our nation's abundant geothermal resources and providing this information to relevant decision-makers. Geothermal energy is already a significant source of electricity to the western grid with around 2800 megawatts of installed capacity in California,

Nevada, Utah and Hawaii. California already relies on its geothermal fields to provide 6 percent of its electricity.

The purpose of this paper is to provide an update on DOE's strategy for achieving its goals and the activities it has undertaken since the initiative was announced.

### ***Challenges***

The challenges to geothermal advancement are varied. Repeated issues for development include:

- Power markets
- Resource identification and characterization
- Economics, financial risks
- Development risks
- Competition by other forms of energy
- Environmental misconceptions
- Siting and permitting delays
- Transactional costs
- Transmission capacity
- Tribal concerns

GPW's primary challenge is to overcome these barriers, create public awareness of, and define a value proposition for the benefits of geothermal development.

### **APPROACH**

#### ***Education, Outreach, and Non-Technical barriers***

Geothermal energy has many advantages over traditional extractive resources, including its relatively minimal environmental and operational impacts. It supplies high capacity factor energy, provides diversification as a regional alternative to fossil-fueled plants, and reduces emissions. However, it unfortunately lags behind other technologies in public perception and support. GeoPowering the West will educate the public about geothermal power, attempt to lower institutional barriers, and seek to speed approval processes for exploration and development of geothermal resources.

GeoPowering the West (GPW) will foster awareness of geothermal availability and benefits, and promote the development and use of geothermal energy throughout the western United States. The effort will begin with education, awareness, and outreach activities aimed at a variety of stakeholders such as businesses, government organizations, Native American groups, and the general public. The GeoPowering the West approach is to work in a multi-faceted way with geothermal users and others who benefit from "market pull" which complements the R&D "technology push". GPW provides a cooperative team for a broad-based approach with various types of geothermal technical assistance to address the needs of geothermal development.

[GPW Approach Chart Here]

### ***The GeoPowering the West Network***

GeoPowering the West has been organized using resources and partners familiar with geothermal energy. All of these activities are supported through four major network areas: Laboratory Support/State Working Group/Communications, External/Industry Partnerships, Federal Partnerships (Regional Offices, Power Marketing Agencies, etc), and State and Tribal Support. GPW activities address institutional issues such as permitting, land access, renewable portfolio standards, tax credits, environmental justice, financing, utility planning, green tags and green pricing programs.

#### GPW participants:

- Department of Energy: Through DOE Headquarters and the Seattle Regional Office and Denver Regional Office the program is directed, managed, and funded.
- The National Renewable Energy Laboratory (NREL) leads work to improve efficiency and reduce maintenance in low to moderate temperature geothermal plants and for the development of new power-cycle technologies and materials.
- The Idaho National Engineering and Environmental Laboratory leads geophysics and geoscience research to help locate and define geothermal reservoirs, thus improving the understanding of large fracture systems.
- Sandia National Laboratories leads work to reduce the cost of drilling and completing geothermal wells (which totals up to 50% of a power project's capital cost).

*The three Labs bring these and other capabilities to the GPW Initiative directly supporting GPW efforts through technical assistance.*

(The Laboratories' function within GeoPowering the West is to *act as a catalyst* that can focus activities within targeted states, primarily through the individual Geothermal State Working Groups. These groups are to be the organizations that can function in the public arena and speak as a voice for the geothermal interests. The group purpose is to know availability of both geothermal and institutional resources, *understand the issues* that hold back geothermal expansion, *determine the reasons* for lack of development, and *identify what should be done* for geothermal advancement.)

- The Western Area Power Administration (WAPA) is a GPW partner with the portfolio of Public Renewables Partners development of public power utilities. This entails facilitating a general renewables market within the framework of WAPA power marketing and transmission. WAPA also has a specific task to study the Pacific DC

Intertie tap with renewable energy inputs and assessments made under the Public Interest Energy Research award from the California Energy Commission.

- The Geothermal Energy Association (GEA) is collects credible and documentable information from operating commercial geothermal electric plants for government use and policy decisions such as information on taxes, royalties paid, or employment statistics.
- The Geothermal Education Office (GEO) fosters geothermal energy deployment by assisting geothermal stakeholders to educate decision-makers in state and local governments and in the environmental and financial communities about the benefits, applications, and impacts of geothermal energy.
- Bob Lawrence and Associates brings together local and state stakeholders, suppliers, users, and environmental groups, and provides project financing education to potential developers, entrepreneurs, and small businesses. It broadens existing and successful outreach and education programs to engage electric utilities, state regulatory agencies, and consumer organizations. The project also produced and disseminates a Geothermal Leasing Workbook that enables geothermal entrepreneurs and small developers to more easily work with state and Federal agencies to obtain geothermal leases, and consequently develop geothermal resources.
- The National Council of State Legislatures educates state legislators and other policymakers about specific geothermal energy policies and technologies.
- The Geothermal Resources Council (GRC) continues DOE-supported, on-going work by the GRC and GEO to develop and disseminate information, provide educational materials, and enhance technology transfer for the geothermal industry.
- Resolve, Inc. establishes, in cooperation with other Federal agencies, a National Geothermal Collaborative that includes broad representation of Federal and State agencies, the geothermal industry, and public interest groups. The purpose is to facilitate communication and coordination of information exchange among the parties. [Note that the Collaborative maintains policy independence from GPW for objective resolution of issues.]
- Oregon Institute of Technology Geo-Heat Center continues on-going work to develop and disseminate information, provide educational materials, develop short courses and workshops, maintain a comprehensive geothermal resource database, respond to inquiries from the public, industry and government, provide engineering, economic and environmental information and analysis on geothermal technology to potential users and developers, and, provide information on market opportunities for geothermal development.

- The University of Nevada Reno's Great Basin Center for Geothermal Energy improves stakeholder outreach in Nevada and the Great Basin, in addition to their resource assessments and R&D activities.
- Washington State University makes the regulatory process less cumbersome and more understandable to developers and regulators of geothermal power projects. The target audience is the entire geothermal community, including policy makers, regulators, developers, financiers, educators, and the general public. A secondary objective is to contribute to reaching the goals of the national geothermal program.

### ***GPW Successes***

Following the GeoPowering the West kick-off event in 2000, the DOE Geothermal Program held a stakeholder meeting at the National Renewable Energy Laboratory (NREL) in Golden, CO to gather input on the opportunities and challenges for GPW to achieve its goals. The DOE formed a team of representatives from DOE, the NREL, the Idaho National Engineering and Environmental Laboratory, Sandia National Laboratories and various stakeholder groups. This has resulted in the following state-by-state activities:

#### ALASKA

With the award of a State Energy Program Grant, efforts have begun to identify the potential of geothermal use in Alaska through contact with Senator Murkowski and the state energy officials.

#### ARIZONA

A state working group has been formed and introductory meetings held. Documentation related to past geothermal investigations has been found and the information is being managed to make it more accessible. In an effort to reverse the lack of visibility of geothermal in past years, industry, a utility, and the GPW program asked the Arizona Corporation Commission to allow geothermal energy to be included as a qualified renewable energy source (as a prerequisite to a power project) under the State's Renewable Portfolio Standard, where it has previously been omitted from the list. This is a good example of raising the visibility of geothermal.

#### CALIFORNIA

GPW efforts have begun in California with interactions at the California Energy Commission. The State is implementing its Renewable Portfolio Standard (RPS) rule of implementation, as well as funding a study of renewable energy availability and the interconnection to a high-voltage DC transmission line that accesses the Southern California grid. GPW has supported industry involvement with both of these efforts. California's recent announcements of geothermal power plants in the Salton Sea and Medicine Lake areas will be followed for lessons regarding development with expectations of more as a result of the State's RPS.

## HAWAII

State Energy officials have participated in the National GPW State Summit reporting on the geothermal situation in the State. Efforts have begun to further investigate the geothermal resources for integration into the electrical systems and even how geothermal might fit with hydrogen production for this island economy which is generally reliant on forms of imported energy.

## IDAHO

The state of Idaho has flourished under GPW attention. Not only has it formed a state working group but it has also developed a strategic plan, identified high potential projects, raised visibility by hosting a GPW conference with Senator Craig, and participated in a geothermal trade mission to Nevada, where geothermal applications and benefits were highlighted for Idaho representatives and policy makers. A power project has been announced in Idaho.

## NEVADA

High-level political attention for geothermal in Nevada continues with two geothermal conferences having been attended by Senator Reid. Nevada forms an “economic cluster” for geothermal, and GPW has supported various activities including, a Geothermal 101 training seminar, the aforementioned trade mission from Idaho and the DC line study, site investigations for the Walker River Paiute and the Pyramid Lake Paiute Reservations, the latter of which has partnered with a member of the geothermal industry for development. GPW has also supported the formation of the state working group, and generally supported the industries and institutions that make up the economic cluster. Around 100 MW of new geothermal generation has been announced in Nevada as a result of the State’s RPS, thus reinforcing the importance of that policy mechanism to geothermal development.

## NEW MEXICO

The first meeting of the State’s geothermal professionals in over a decade was held with the first of the GPW State Working Group meetings. Senator Bingaman spoke at a conference that raised the visibility of geothermal in the state. GPW efforts also supported a Renewable Portfolio Standard Process that resulted in a 10% standard for the investor-owned utilities in the state, thus helping to create a market for geothermal. Federal institutions in New Mexico (Sandia, Los Alamos National Laboratory, Kirtland Air Force Base, and the DOE itself) have also sought to procure renewable energy directly as wholesale customers. Efforts to support Tribal use of geothermal have been ongoing, the most notable of which is the Jemez Pueblo which is defining an economic opportunity through a business plan.

## OREGON/WASHINGTON

A site visit to the Newberry Crater was organized, along with an introductory State Working Group meeting (combined with the State of Washington) to discuss land management and other

issues. Also, examination of direct-use applications in the Klamath Falls area served to highlight the potential of geothermal. This was supported by the Oregon Institute of Technology Geo-Heat Center.

### UTAH

Utah has formed a state working group and prioritized areas for development. A CD-ROM has been developed in support of geothermal education in the state. A Renewable Portfolio Standard has not yet been developed in the state, although this remains an area for further investigation.

### OTHER GPW ACCOMPLISHMENTS

GPW remains active in the public arena. In addition to involvement with the Renewable Portfolio Standard processes by Sandia, and many high visibility events, certain documents have been created. The Geothermal Today Publication, contributions to the GRC bulletin, and brochures have all contributed to communicating current and relevant information to the geothermal community. Outside of that community, topical reports have been produced such as the Geothermal Facility Siting Issues Workshop report, Assessing the Potential for Renewable Energy on Public Lands, and Opportunities for Near-Term Geothermal Development on Public Lands in the Western United States, all authored by NREL.

The creation of resource maps is one of the most important things that DOE can do to support technology development in the states. The INEEL has, through the GPW, produced geothermal maps for all of the Western U.S. states. By the example of New Mexico shown below, there are seven areas of power generation potential and widespread areas of direct-use potential, thus providing a persuasive argument in this period of increasing concern about coal emissions and natural gas volatility.

[NM Map Here]

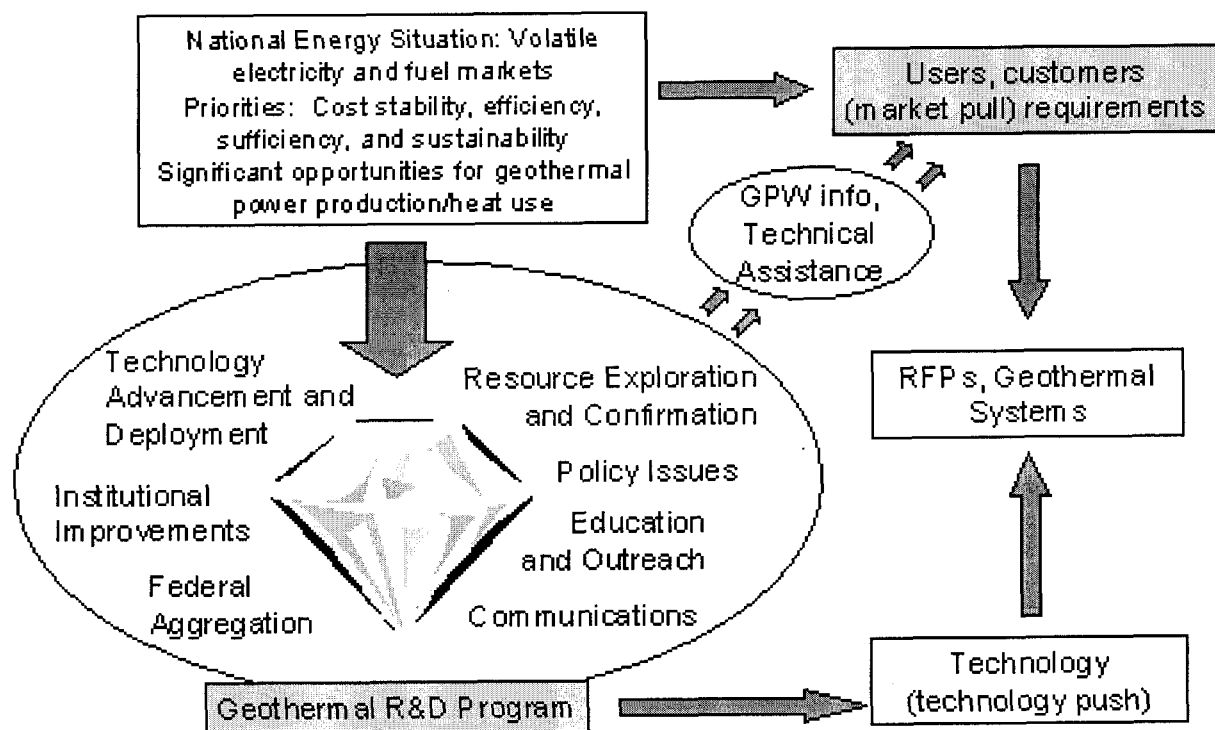
### **Future Opportunities/Conclusions**

GPW will continue to support its four major network areas through its DOE Laboratory team and its many national, regional, and state agencies and institutional partners. It will continue to focus on the activities and their replication to advance geothermal by agencies and states. GPW will continue to provide technical assistance to states that are considering, or are in the early stages of implementing, Renewable Energy policies that might include geothermal. We will help sponsor and participate in state and regional geothermal workshops and support state geothermal working groups. We will continue to build relationships with Native Americans, the public power sector, and land managers so that they understand and can pursue the economic development benefits of local geothermal energy. We have offered the GPW resource maps to the Energy Atlas publication for its next edition to facilitate broad dissemination. We will continue to work with Tribes so that they can benefit from this indigenous resource. We will support individual

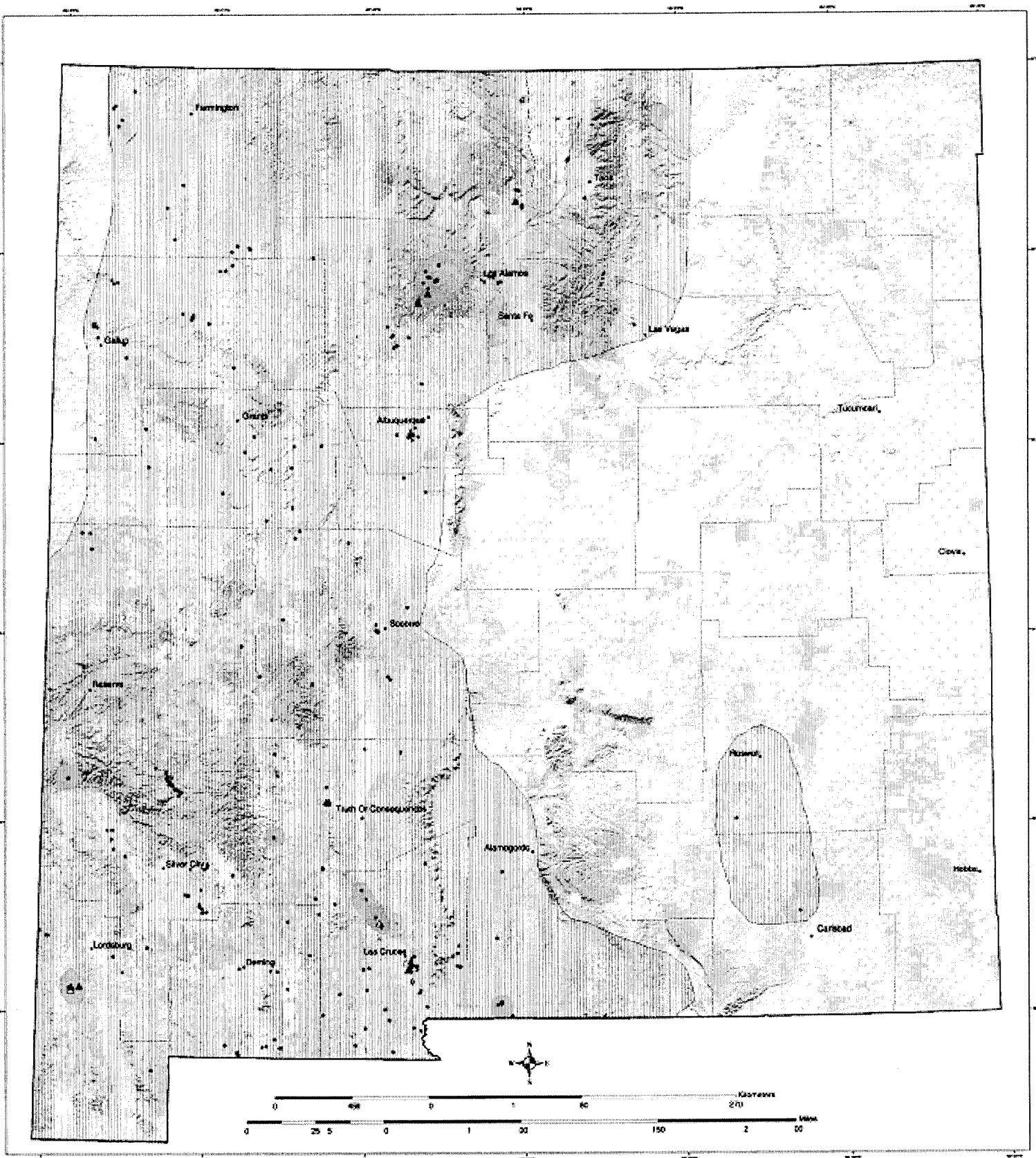
projects with technical assistance as our resources allow. We will continue to undertake these activities in a manner that leverages our limited resources, and utilizes existing relationships and activities. We will also continue to do so in a manner that does not duplicate efforts and, first and foremost, present geothermal development as a realistic option for economic development throughout the Western US.

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# GeoPowering the West Approach



# New Mexico Geothermal Resources



**Legend**

- City/Town
- County Boundary
- River/Stream
- Lake and Reservoir

**Geothermal Categories**

- Geothermal Power Plant
- Direct Heating
- Geothermal Spring/Wells (>20 degrees C)
- Area with Potential for Electrical Generation
- Area with Potential for Direct Use Applications

**Ownership**

- Private Land
- Bureau of Land Management and other Federal Land
- State Land
- Native American Land
- U.S. Forest Service

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